Take-Home Quiz
Topic 04: Molecular Structure and Polarity

Objective:

This is to assess your comprehension of the material we have covered so far and to help prepare you for the exam.

Instructions and Notes:

- Most of the quiz problems are from or adapted from "Exercises" at the end of the chapters in the Chemistry: Atoms First 2e Online Textbook (OpenStax)
- You must *CLEARLY LABEL* all problems and *SHOW ALL WORK* neatly and legibly to receive credit. If the problems do not require calculations/work then you must explain how you got the answer. (can be a few words up to a few sentences or even a few arrows)
- If the problem requires calculations, the answers should be highlighted or boxed.
- Book sections covered: 4.6, 4.2

Submission:

The quiz is usually due ~1 week after we start this section (see our due date schedule). Summer session is due sooner. This should be scanned as a single PDF and submitted online through Canvas. The file cannot be larger than 20 Mb (20,000 kB).

Helpful Tips:

- Start as soon as we're done with the lecture.
- Refer to the lecture and/or videos (if available).
- Use the corresponding chapter in the book to help you through difficult problems/concepts.
- There are answers and solutions available to the odd numbered problems (book number not quiz number) on the OpenStax website under "Student Resources". It is not advised to rely on the solutions because you will not have access to the solutions during the exam. Only use the solutions as a last resort. Struggling is good and that is when you are learning the most!
- Work together with your classmates.
- Go to tutoring in the ASTC or MESA, ask your classmates in our Discord room, watch YouTube Videos, come to office hours, etc.
- To ensure your mastery of the material, do the quiz multiple times.

4.6 Molecular Structure and Polarity

1) (From Chapter 4.6 #77) Explain the difference between electron-pair geometry and molecular structure.

(From Chapter 4.6 #82) Identify the electron pair geometry and the molecular structure of each of the following molecules or ions:

Skip this one) IF_6^+ 2) CF_4 Skip this one) BF_3

Skip this one) SiF_5^- Skip this one) $BeCl_2$

(From Chapter 4.6 #83) What are the electron-pair geometry and the molecular structure of each of the following molecules or ions?

Skip this one) ClF_5 3) ClO_2^- Skip this one) $TeCl_4^{2-}$

4) PCl_3 Skip this one) SeF_4 5) PH_2^-

(From Chapter 4.6 #85) Identify the electron pair geometry and the molecular structure of each of the following molecules:

6) ClNO (N is the central atom) 7) CS_2 8) Cl_2CO (C is the central atom)

9) Cl_2SO (S is the central atom) 10) SO_2F_2 (S is the central atom)

Skip this one) XeO_2F_2 (Xe is the central atom) Skip this one) $ClOF_2^+$

4.2 Covalent Bonding

11) (From Chapter 4.2 #14) Explain the difference between a nonpolar covalent bond, a polar covalent bond, and an ionic bond.

(From Chapter 4.2 #15) From its position in the periodic table, determine which atom in each pair is more electronegative:

12) Br or Cl 13) N or O 14) S or O 15) P or S

16) Si or N 17) Ba or P 18) N or K

(From Chapter 4.2 #17) From their positions in the periodic table, arrange the atoms in each of the following series in order of increasing electronegativity:

19) C, F, H, N, O

20) Br, Cl, F, H, I

21) F, H, O, P, S

22) Al, H, Na, O, P

23) Ba, H, N, O, As

(From Chapter 4.2 #21) Identify the more polar bond in each of the following pairs of bonds:

24) HF or HCl

25) NO or CO

26) SH or OH

27) PCl or SCl

28) CH or NH

29) SO or PO

30) CN or NN

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31) (From Chapter 4.6 #79) Explain how a molecule that contains polar bonds can be nonpolar.

(From Chapter 4.6 #87) Draw the 3D structures of these molecules. Which of the following molecules and ions contain polar bonds? Which of these molecules and ions have dipole moments?

Skip this one) ClF_5

32) ClO_2^-

Skip this one) $TeCl_4^{2-}$

33) PCl_3

Skip this one) SeF_4

Skip this one) PH_2^-

Skip this one) XeF_2

34) (not in book) H_2O

(From Chapter 4.6 #89) Draw the 3D structures of these molecules. Which of the following molecules have dipole moments?

35) CS_2

36) SeS_2

37) CCl_2F_2

38) PCl_3

39) ClNO (N is the central atom)